

The contribution of dietitians to the primary health care workforce

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ABSTRACT

INTRODUCTION: Dietetic intervention is effective in the management of nutrition-related conditions and their comorbidities. New Zealand has an increasing need for primary and preventive health care to reduce the burden of non-communicable disease.

AIM: To review the recent evidence of effectiveness of dietetic intervention in primary health care on health and wider economic outcomes. Health benefits and cost benefits of employing dietitians to perform nutrition intervention in the primary health care setting are evaluated in the areas of obesity in conjunction with diabetes and cardiovascular disease, and malnutrition in older adults.

METHODS: An electronic literature search of four scientific databases, websites of major dietetic associations and high-impact nutrition and dietetic journals was conducted. Randomised controlled trials and non-randomised studies conducted from 2000 to 2014 were included.

RESULTS: Dietetic intervention demonstrates statistically and clinically significant impacts on health outcomes in the areas of obesity, cardiovascular disease, diabetes, and malnutrition in older adults, when compared to usual care. Dietitians working in primary health care can also have significant economic benefits, potentially saving the health care system NZ\$5.50–\$99 for every NZ\$1 spent on dietetic intervention.

DISCUSSION: New Zealand must look to new models of health care provision that are not only patient-centred but are also cost-effective. This review demonstrates that dietitians in primary health care can improve patients' health and quality of life. Increasing the number of dietitians working in primary health care has the potential to make quality nutrition care accessible and affordable for more New Zealanders.

KEYWORDS: Allied health; chronic disease; diabetes mellitus; dietetics; dietitian; primary health care

Introduction

The health sector faces major challenges arising from an ageing population and the increasing burden of chronic disease. Nutrition is a key factor in both of these areas; poor nutrition in much of the New Zealand (NZ) population is contributing to the impact of chronic disease on our health system.¹ Improvement in nutrition status by education and access to healthy food will have an impact on the wellbeing of NZ people.¹

Non-communicable diseases, such as diabetes and cardiovascular disease (CVD), caused 63% of deaths globally in 2008, and this proportion is predicted to increase into the future.² Forty-four

percent of these deaths occurred before the age of 70 years.² Non-communicable diseases causing premature death are largely preventable through reduction of tobacco use, harmful alcohol use, inadequate physical activity, and unhealthy diets.² In NZ, obesity has increased across all age and ethnic groups, which has led to an increase in the prevalence of non-communicable diseases, such as Type 2 diabetes and associated conditions.³ Thirty-one percent of adults and 11% of children in NZ are now obese, totalling 1.2 million people nationally.⁴ The Nutrition and Burden of Disease study assessed premature deaths and years of life lost attributable to nutrition-related factors, estimating that nutrition plays a role in about 9000 deaths a year in NZ (two in every five deaths).¹

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NZ's ageing population means that the proportion of the population aged 65 years and older will increase from 13% to 25% by 2051.⁵ This age-group incurs the greatest health and disability expenditure and has the highest rate of preventable hospital admissions.⁶ Approximately half of this population group is expected to access residential care before they die.⁷ Nutrition is a key determinant of successful ageing, as food is critical to physiological, social, cultural and psychological quality of life.⁸ Poor nutrition can lead to clinical malnutrition and, with it, many other preventable health conditions, increasing the risk of hospitalisation, disability and mortality. Recent research estimates 31–60% of the older NZ population to be at high nutrition risk.^{9–11}

Dietitians apply robust scientific knowledge about food and nutrition to promote optimal health outcomes to individuals, groups and communities in states of both health and disease. Dietitians are registered health professionals who meet standards required by the NZ Dietitians Board under the NZ Health Practitioners Competence Assurance Act (HPCA) 2003. Dietitians are the only registered and suitably qualified profession in NZ able to prescribe and manage therapeutic diets for patients, making them the ideal health professional workforce to address nutrition risk factors. The value of dietetic interventions is hard to measure, as results can take months or years to become obvious or measurable. This often results in uncertainty about the value of dietetic care.

This systematic review collates and examines recent evidence of effectiveness of dietetic counselling in primary care in terms of health and economic outcomes. The review focuses on the cost-benefits of employing dietitians to provide nutrition information and counselling, particularly in the areas of obesity in conjunction with diabetes and CVD, and in malnutrition in the ageing population.

Methods

Search strategy

Electronic searches were conducted to identify primary and secondary research into the impact of dietitians in primary care. Medline

WHAT GAP THIS FILLS

What we already know: Dietetic intervention is effective in the management of acute and chronic nutritional conditions and their comorbidities in a hospital setting. New Zealand has an increasing need for primary and preventive health care to reduce the burden of non-communicable disease.

What this study adds: Dietetic intervention in primary health care reduces hospital admissions and improves health and nutritional outcomes for people with chronic conditions, and is shown to have significant positive health and economic benefits. This review supports the role of dietitians in primary health care.

via ProQuest, Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus, PubMed and Scopus were searched for English-language articles published between January 2000 and February 2014. An adjusted search strategy using Boolean operators was used in each database, separately for each of the two research areas. Key search terms included (ti(dietetic*) OR ti((dietitian* OR dietician*)) OR ti(nutritionist*)) AND (ti((workforce* OR labour force)) OR ti((workers OR personnel))).

Websites of large dietetic associations (Dietitians Association of Australia, Dietitians of Canada, Academy of Nutrition and Dietetics [USA], The British Dietetic Association and The European Federation of the Association of Dietitians) were searched for relevant position papers and links to further articles.

Highly ranked international nutrition and dietetics journals were also searched for relevant articles, including *The Canadian Journal of Dietetic Practice and Research*, *The Journal of the American Dietetic Association*, *The Journal of Human Nutrition and Dietetics*, and *The Journal of Nutrition and Dietetics*. Keywords used were: workforce, labour force, workers, staff, primary care, ambulatory, prevention, diabetes, obesity, metabolic syndrome, aged care, elderly, residential and malnutrition.

Literature selection

The reviewer (AH) assessed the titles and abstracts of all identified studies. The effect of dietitians in primary care was considered in two

categories: health outcomes and economic outcomes. Assessment of health outcomes involved reviewing systematic reviews of randomised controlled trials (RCTs), individual RCTs, and non-randomised studies (NRS) that examined dietetic care compared to usual care, or the effects of dietetic care on patient outcomes over time. Outcomes assessed included: knowledge and management of malnutrition by health professionals; incidence of Type 2 diabetes; body weight; body mass index (BMI); waist circumference; HbA1c; fasting blood glucose; measures of CVD risk, blood lipid levels and blood pressure; physical functionality; nutritional status; risk of hospital readmission and oral intake.

The quality of reviewed studies was assessed by AH and studies that did not compare dietetic intervention to standard practice or a quasi-control were excluded. Qualitative reports and surveys were included in the assessment of economic benefit.

Results

Electronic searches returned 534 articles regarding dietitians in primary care. Articles were included or excluded after reading the title and abstract. Following searching of international dietetic journals and websites, 47 articles remained for which full-text papers were obtained for detailed inspection: 21 studies were relevant to dietitians in primary care and met the inclusion criteria. Eight were RCTs, six were NRS and two were systematic reviews. In addition, three studies and one systematic review reporting on economic outcomes were included in the current study.

Health outcomes

Studies that included overweight adults and people with diabetes and cardiovascular disease

Table 1 shows the characteristics of included studies and their outcome measures with statistically significant results. All five RCTs assessing CVD risk, diabetes and obesity health outcomes in primary care found significant benefits from dietetic intervention compared to usual care.^{12–16} Three trials were conducted with diabetes

patients in the USA, Canada and Taiwan. Over 12–24 months of follow-up, these three RCTs showed that dietitian-led intervention groups decreased body weight, BMI, waist circumference and/or HbA1c compared to usual care.^{12–14}

RCTs in the USA and Denmark investigated community-based dietetic intervention in patients with CVD risk.^{15,16} Dietitians implementing medical nutrition therapy decreased body weight and both total and low-density lipoprotein (LDL) cholesterol, compared with usual care at six months.^{15,16}

NRS also provided evidence that dietetic input in primary care is beneficial to patient health outcomes. Three studies measured health outcomes of patients with diabetes or CVD before and after dietetic intervention, and in all cases dietetic input had statistically significant impacts on body weight, HbA1c and other measures of CVD and diabetes risk.^{17–19}

Two systematic reviews have also been completed, each combining evidence for different outcomes relating to patient benefits.^{20,21} Walker et al. explored whether Type 2 diabetes can be prevented by dietetic interventions.²⁰ They found four cohort studies that showed that incidence can be reduced by 28–59% with lifestyle change.²⁰ Collins et al. assessed the effectiveness of dietetic intervention for childhood obesity.²¹ Meta-analyses were used to quantify this relationship, the results suggesting that there is insufficient evidence to determine the effectiveness of dietary interventions in treating excessive weight gain in children and adolescents, although interventions that include a dietary treatment in this patient group were effective in gaining improvements in weight-related outcomes.²¹

Studies of malnutrition in older populations

Six studies assessed outcomes of dietetic intervention compared to no intervention or to baseline results for malnutrition in older populations.^{22–27} The results indicated that positive health outcomes are seen when older populations are treated by dietitians in the community. Table 2 shows the studies' characteristics and outcome measures with statistically significant results.

Table 1. Diabetes obesity and cardiovascular disease risk: study outcomes and results

Study	Study Type	Study size Length of intervention	Intervention	Outcome measures	Difference (intervention vs control)	P-value
Delahanty et al. 2001¹⁵	RCT	90 primary care patients	Patients with non-medicated hypercholesterolaemia randomised to receive MNT-dietitians or usual care from GP for 6 months	Total cholesterol LDL cholesterol Body weight	-6% -6% -1.9 kg	$p<0.0001$ $p<0.05$ $p<0.001$
USA		6 months				
Willaing et al. 2004¹⁶	RCT	503 primary care patients	Patients randomised to dietitian referral or nutritional counselling by GP	Body weight	-2.0 kg	$p=0.02$
Denmark		12 months				
Wolf et al. 2004¹²	RCT	147 patients	Patients with Type 2 diabetes and obesity randomised to lifestyle case management by a registered dietitian or usual care	Body weight Waist circumference Prescription medications taken Quality of life	-3.0 kg -4.2 cm -0.8	$p<0.001$ $p<0.001$ $p<0.03$ $p<0.001$
USA		12 months				
Huang et al. 2010¹⁴	RCT	154 patients	Patients with Type 2 diabetes randomised to either routine care group or registered dietitian-led intervention group who received diabetic self-management education every 3 months	HbA1c Fasting blood glucose	-0.5% -1.68 mmol/L	$p=0.034$ $p=0.007$
Taiwan		12 months				
Battista et al. 2012¹³	RCT	101 patients	Patients with Type 1 or Type 2 diabetes assigned to either conventional endocrinologist care or dietitian-coached group	Body weight Body mass index Waist circumference HbA1c	-2.8 kg -0.4 kg/m ² -3.7 cm -0.3%	$p=0.04$ $p=0.009$ $p=0.01$ $p=0.04$
Canada		24 months				
Gamblen et al. 2007¹⁷	NRS	An average of 4600 patients per year for 5 years	9 dietitians based at 80 primary care organisations received referrals from physicians and other health care workers for any type of nutrition-related problem	Fasting blood glucose Total cholesterol LDL cholesterol Total triglycerides	-2.96 mmol/L -0.75 mmol/L -0.78 mmol/L -0.44 mmol/L	$p<0.001$ $p<0.001$ $p<0.001$ $p<0.001$
Canada						
Welty et al. 2007¹⁹	NRS	80 patients	Overweight or obese patients with more than one other cardiovascular risk factor or coronary heart disease referred to see a dietitian concurrently with their physician	Body weight Diastolic blood pressure	-5.3% -4 mm Hg	– $p=0.003$
USA		Average follow-up of 21 months				
Harding et al. 2011¹⁸	NRS	541 rural primary care patients	Overweight and obese patients with Type 2 diabetes referred to a dietitian	HbA1c Body mass index	-0.6%–0.9 kg/m ²	$p=0.003$ $p=0.05$
UK		12 months				
Collins et al. 2006²¹	SR	2262 participants across 37 RCTs	RCTs with participants younger than 18 years of age that included a dietary intervention in isolation or combination with other lifestyle modifications, compared to a control	Childhood obesity rates	Insufficient evidence to determine the effectiveness of dietary interventions in treating excessive weight gain	
Australia		Range of interventions from 6 weeks to 18 months				
Walker et al. 2010²⁰	SR	4864 patients from 4 cohort studies	Patients with impaired fasting glucose or impaired glucose tolerance at high risk of progression to Type 2 diabetes underwent lifestyle modification	Type 2 diabetes incidence	Less 28–59%	–
UK/Australia		Follow-up for 2.5–6 years				

GP General practitioner

MNT Medical nutrition therapy

NRS Non-randomised study

RCT Randomised controlled trial

SR Systematic review

Two RCTs found benefits in anthropometric and nutrition status outcome measures.^{23,24} A statistically significant improvement in mobility, body weight, energy intake and/or protein intake in elderly community members was demonstrated with dietetic intervention compared to usual GP care in both RCTs.^{23,24} Schilp et al. completed a similar RCT comparing the effects of dietetic referral and no referral in undernourished community-dwelling individuals and found a statistically significant weight gain only in physically active participants, but not those who were inactive.²⁵

NRS also found positive effects of dietetic intervention in older populations.^{26,27} Babineau et al. found improvements in energy and protein intake, as well as biochemical indicators of nutrition status, when observing patients before and after six months of dietetic intervention.²⁶ This study was completed in an inpatient environment. Patients were seen for follow-up weekly, which is also feasible in a community setting.²⁶ Tyrovolas et al. observed the difference in elderly populations with and without access to a dietitian in their community, over a five-year cohort study period.²⁷ The long-term presence of a dietitian increased the adherence of older people to a healthy dietary pattern.²⁷

Kennelly et al. surveyed health professionals about nutrition knowledge and management of malnourished patients before, immediately following, and six months after implementing a dietitian-led education programme.²² The community dietetic intervention was an education programme, incorporating Malnutrition Universal Screening Tool (MUST) training. Nutrition knowledge of health professionals improved significantly and they almost all reported improved management of malnutrition: 69% reported weighing patients more frequently; 80% reported giving dietary advice to prevent or treat malnutrition; and 80% stated that the MUST was an acceptable nutrition screening tool.²²

Economic outcomes

Studies shown in Table 3 conclude that dietetic input in primary care has substantial economic benefit. One large cost-benefit analysis, two NRS

and one systematic review have investigated the cost-benefit or cost-effectiveness of nutrition and dietetic services. All studies found substantial benefit.^{15,28-30} Table 3 shows the characteristics of included studies and outcome measures with statistically significant results.

The Dutch Association of Dietitians commissioned a cost-benefit analysis from SEO Economic Research to investigate the total financial benefits of specialised dietary treatment compared with standard treatment of providing reading material about healthy eating and exercise.²⁸ This research showed that, for every NZ\$1 spent on dietetic interventions, a net NZ\$22-99 is saved in terms of improved health, total health care costs and productivity gains, depending on the intensity of the dietetic intervention (estimated savings converted from euro to NZ\$ 4/12/14).²⁸

Robbins et al. retrospectively examined the patient records of over 18 000 patients with diabetes, including community health care visits and hospital admissions.²⁹ Each nutritionist visit was associated with 4.7 fewer hospital visits per 100 person-years, and therefore an average cost saving of NZ\$8,382 (estimated savings converted from US\$ to NZ\$ 4/12/14).²⁹ Delahanty et al. conducted a cost-effectiveness analysis following a six-month trial comparing medical nutrition therapy from dietitians with usual care from general physicians, for patients with hypercholesterolaemia.¹⁵ Medical nutrition therapy decreased both total and LDL cholesterol by 6% in six months, and this decrease was sustained by three-monthly follow-up with dietitians. Each NZ\$1 spent on dietetic intervention saved NZ\$5.50 in other health care and medication costs (estimated savings converted from US\$ to NZ\$ 4/12/14).¹⁵

Pavlovich et al. conducted a systematic review of 13 RCTs on the cost-effectiveness of providing outpatient nutrition services.³⁰ Findings showed consistent evidence to support the cost-effectiveness of nutrition therapy in reducing cholesterol, body weight and fasting blood glucose. Each mmol/L decrease in LDL cholesterol or 0.5 kg decrease in body weight had substantial cost benefits (NZ\$24 to NZ\$1,524 per mmol/L decrease

Table 2. Malnutrition in older adults: study outcomes and results

Study	Study type	Study size Length of intervention	Intervention	Outcome	Difference (intervention vs control)	P-value
Payette et al. 2002²⁴	RCT	83 elderly people 16 weeks	Provision of an oral supplement and encouragement to eat by a dietitian or no intervention	Body weight Energy intake	+1.58 kg +1.388 MJ/day	$p < 0.001$ $p < 0.001$
Canada						
Beck et al. 2012²³	RCT	152 patients 12 weeks	3 follow-up appointments with either a GP and dietitian or GP alone	Improved mobility Body weight Energy intake Protein intake	+8% +1.8 kg +1.1 MJ/day +9 g/day	$p = 0.029$ $p = 0.035$ $p = 0.001$ $p = 0.001$
Denmark						
Schilp et al. 2013²⁵	RCT	142 people aged >65 years 6 months	Referral to treatment by a dietitian or no referral	Body weight, physical performance, handgrip strength, energy intake, protein intake, fat-free mass	NS Subgroup analyses	Treatment effect on body weight in physically active participants ($\beta = 1.25$ kg, 95% CI 0.70–2.11) and not in inactive participants ($\beta = -0.20$ kg, 95% CI -1.16–0.75).
The Netherlands						
Study	Study type		Intervention	Outcome	Difference (end value – start value)	P-value
Babineau et al. 2008²⁶	NRS	62 people aged >65 years	Nutritional assessment and intervention with weekly follow-up. Baseline and 1, 3 and 6 month measurements	Energy intake Protein intake Serum albumin Prealbumin Transferrin Haematocrit	+0.714 MJ/day +5.5 g/day +1.08 g/L +0.02 g/L +0.06 g/L +1%	$p = 0.0001$ $p = 0.01$ $p = 0.001$ $p = 0.003$ $p = 0.024$ $p = 0.026$
Canada		6 months				
Kennelly et al. 2010²²	NRS	8 primary care practices (96 health care professionals)	Education programme implemented in practices. Nutritional knowledge assessed before, immediately after and 6 months after intervention by self-administered questionnaire	Health professionals nutrition knowledge	+2.3 mean knowledge score	$p < 0.05$
Ireland		6 months				
Tyrovolas et al. 2014²⁷	NRS	1486 people aged >65 years	MEDIS—health and nutrition survey to evaluate bio-clinical, lifestyle and behavioural characteristics of older adults. 75–89% participation rate	Adherence to healthy dietary pattern Protein intake	+0.6 MedDietScore +0.8% energy intake	p for trend = 0.05
Greece		4 years				p for trend = 0.02

MEDIS Mediterranean Islands Study

MedDietScore Mediterranean Diet Score

NRS Non-randomised study

RCT Randomised control trial

in serum LDL and NZ\$2.86 to NZ\$12 per 0.5 kg lost). Individual studies provided different estimates based on the different cost perspectives they used, but most agreed that there is definite cost benefit, dependent on the health problem investigated.³

Discussion

Findings from the reviewed studies support beneficial patient health outcomes from access to dietetic services in primary care. From an extensive database search and literature review, five

Table 3. Economic outcomes and results

Study	Study type	Study size Length of intervention	Description	Outcome	Results NZ\$*
Delahanty et al. 2001¹⁵ USA	NRS	18 404 patients of Philadelphia health care centres 8 years follow-up	Examination of patient records of health care visits and hospital admissions. Patient had been diagnosed with Type 2 diabetes during this time	Cost-effectiveness ratio Cost-benefit per \$1 invested in dietetic intervention	+\$36 for each 1% decrease in total and LDL cholesterol levels +\$5.50
Pavolich et al. 2004³⁰ USA	SR	13 studies met the eligibility criteria	RCTs published between January 1966 and September 2001 that reported on costs and effectiveness of outpatient nutrition services for any indicated condition were identified and reviewed	Cost-effectiveness of outpatient nutrition services from an economic perspective	Relatively consistent evidence exists to support the cost-effectiveness of nutrition services. \$24–\$1,524 per mmol/L decrease in serum LDL. \$2.86–\$12 per 0.5 kg lost
Robbins et al. 2008²⁹ USA	NRS	90 primary care patients 6-month intervention	Patients with non-medicated hypercholesterolaemia randomised to receive MNT for dietitians or usual care from GP for 6 months	Cost-benefit per nutrition consultation	+\$8,382
Lammers & Kok 2012²⁸ Holland	Cost-benefit analysis	–	Compared the benefits of treatment by a dietitian with those of the provision of reading material about healthy eating and exercise. In addition, it demonstrated the benefits for the various parties involved (patient, family, dietitian, health care insurers, employers and premium payers)	Cost-benefit per \$1 invested in dietetic intervention	+\$22–\$99

GP General practitioner

MNT Medical nutrition therapy

NRS Non-randomised study

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* Currency converted to NZ\$ 4/12/14

RCTs found that patients treated by dietitians in primary health care had significantly improved obesity, CVD, and diabetes health outcomes compared to patients receiving usual care.^{12–16}

One trial found benefit only in one subgroup of the population.¹⁴ The results of three NRS supported the findings of the RCTs. The systematic review of dietetic interventions in patients with high risk of progression to Type 2 diabetes also demonstrated the efficacy of lifestyle modification interventions. This indicates that dietitians are more effective than usual care in improving health outcomes in patients with obesity, CVD, and diabetes, or at risk of diabetes.

A smaller group of studies demonstrated that dietetic intervention improves oral energy and protein intake in older adults with malnutrition, as well as health indicators such as body weight.^{23–27}

One study also showed that dietetic training of other health professionals in nutrition improved their nutrition knowledge long-term and their reported management of malnutrition.²²

The economic analyses also demonstrated the financial benefit of dietetic intervention in primary care. Four studies investigated the cost-benefit or cost-effectiveness of nutrition and dietetic services.^{15, 28–30} All found substantial benefit. These

studies suggested an estimated NZ\$5.50–\$99 saving for every dollar spent on dietetic intervention, through reduced hospital admissions and medical treatment. Overall, especially considering the magnitude of the potential cost savings, these studies provide convincing evidence for the economic benefits of increasing the number of dietitians working in primary care.

Government strategies such as the Primary Health Care Strategy state a need for the health workforce to work in new ways,³¹ which should include population-based approaches to health care that emphasise prevention, education, health maintenance and wellbeing, and strengthening of connections with health agencies, social and community services, and iwi.³¹ The prevalence of all cardiovascular and metabolic health conditions is increasing year by year alongside the prevalence of obesity.⁴ These figures are disproportionately large in the Māori and Pacific Island populations, and also in areas of lower socioeconomic status.⁴ The high health needs of these groups are generally met by local primary care providers, especially in isolated areas.

It may not be feasible or affordable to provide access to dietitians for all people in NZ with chronic conditions and the malnourished elderly. However, in NZ, dietitians are the only recognised health workforce with the appropriate credentialing to deliver and lead both individual and community dietetic and nutrition interventions. Ideally, quantitative evidence should be used to determine whether a workforce's size balances the need for that workforce. There is limited data on the dietetic workforce in NZ. In the UK, there is an established recommendation for dietetic input for diabetes care of 4.0 full-time equivalents (FTE) per 250 000 head of population. NZ currently has approximately 1.67 FTE per 250 000 head of population—less than half of the UK recommendation.³²

Historically, the NZ health sector has focused on health care delivery centred on acute and secondary care. Financial and demographic pressures are now rendering that model unsustainable. Policy makers and funders must look to primary care models of health care provision to keep patients

living independent lives for longer without the need for high-cost hospital admissions.

Strengths and limitations

This research was conducted as a systematic review, with research questions posed, literature found and results extracted following a predetermined and unbiased method. All published studies of reasonable quality were included in the review, regardless of the direction of their results. The review includes studies only from the past 14 years to ensure the results are currently relevant.

This systematic review evaluated 21 studies with varying outcome measures. Studies estimating dietary intake and lifestyle factors are fraught with possible confounding and difficulties in data collection. The NRS in this review lacked strength because interventions were not compared with a control group. However, the studies presented in this review support the findings of the RCTs in that they provide examples of the improvements in the clinical health measures that patients can have under the care of a dietitian. The findings are also supported by several large trials of dietary and lifestyle interventions in people with insulin resistance.^{33–37}

The included studies were conducted internationally, so may not take into account all of the factors, including ethnic diversity, affecting health care delivery in NZ. However, research has been conducted in a wide range of developed countries and similar results were found, increasing the likelihood that these interventions would be equally beneficial in similar populations within NZ.

To conclude, providing dietetic care in the community has shown to have significant health and economic benefits internationally, improving health outcomes in chronic conditions and reducing hospital admissions. This review supports a similar model being applied in NZ.

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COMPETING INTERESTS

None declared.